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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,811	07/14/2003	Jin-Young Lee	61610078US	4174

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H.C. PARK & ASSOCIATES, PLC
8500 LEESBURG PIKE
SUITE 7500
VIENNA, VA 22182

EXAMINER	
LEE, CYNTHIA K	
ART UNIT	**PAPER NUMBER**
1795	

NOTIFICATION DATE	DELIVERY MODE
11/28/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATENT@PARK-LAW.COM

Office Action Summary	Application No.	Applicant(s)	
	10/617,811	LEE ET AL.	
	Examiner	Art Unit	
	Cynthia Lee	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 14-16* is/are pending in the application.

4a) Of the above claim(s) *14-16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☑ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/20/2007 has been entered.

Response to Arguments

This Office Action is responsive to arguments filed on 9/20/2007. Claims 1-12 and 14-16 are pending. Claims 14-16 are withdrawn from further consideration as being drawn to a non-elected invention. Applicant's arguments have been considered and are not persuasive. Thus, claims 1-12 are rejected for reasons of record.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (JP 11-273731).

Naoki discloses a lithium ion secondary battery comprising a positive electrode including a material that is capable of reversible intercalation/deintercalation of lithium

ions as a positive material (particularly $LiCoO_2$, $LiMn_2O_4$, $LiNiO_2$), a negative electrode including a material capable of reversible intercalation/deintercalation of lithium ions as a negative material, a separator interposed between the positive and negative electrodes, and an electrolyte on the separator wherein the electrolyte includes a non-aqueous organic solvent, a lithium salt, and a linear polymer having P=O bonds (Abstract and [0028, 0029, 0031, 0033]). (Applicant's claim 1)

Naoki discloses using non-aqueous organic solvents comprising cyclic and linear carbonates, such as ethylene carbonate (EC), propylene carbonate (PC), dimethyl carbonate (DMC), methylethyl carbonate (MEC), diethylene carbonate (DEC) [0028]. (Applicant's claims 2-4)

Naoki discloses lithium salts comprising LiPF6, LIBF4, LiClO4, LiN(SO2CF3)2, LiC(SO2CF3)3 in the amount of between 1M and 1.7M [0029]. (Applicant's claims 9 and 10)

Naoki discloses wherein the electrolyte includes a polymerized phosphoric ester, as illustrated as formula. 3.

The amount of the phosphoric ester polymer is 5 vol%. Naoki discloses that the phosphoric ester polymer is 5 vol% and not wt%. Naoki does not disclose the density of the polymer to define a wt% of polymer in the electrolyte (applicant's claim 1). The Office notes that the density of most materials is about 1g/ml and thus, vol% is approximately weight %. It has been held that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium

Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05.

Regarding claim 11, it has been considered but was not given patentable weight because the courts have held that the method of forming the product is not germane to the issue of patentability of the product itself. "[Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from the product of prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113. Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir.1983).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (JP 11-273731) as applied to claim 11 in view of Yeager (US 2002/0177027).

Naoki discloses all the elements of claim 11 and is incorporated herein. Naoki does not disclose wherein the electrolyte includes a phosphonate as claimed in claim

12. However, Yeager discloses that dialkylvinylphosphonates, such as diethylvinylphosphonate ([0071], lines 11-12 from the bottom) are used as flame retardants. It is commonly known in the art that thermal instability and explosions are problems with batteries, particularly Li ion batteries, as disclosed by Naoki [0003]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to polymerize dialkylvinylphosphonates instead of a phosphoric ester for the benefit of reducing explosions and thus, making a safer Li ion battery. Considering the limited number of species in the class of dialkylvinylphosphonates, it is found that dimethylvinylphosphonate and dipropylvinylphosphonate are obvious for the same reason given above.

Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (JP 11-273731) as applied to claim 1 in view of Tsutsumi (US 6645671).

Naoki discloses a lithium ion secondary battery comprising a positive electrode including a material that is capable of reversible intercalation/deintercalation of lithium ions as a positive material (particularly $LiCoO_2$, $LiMn_2O_4$, $LiNiO_2$), a negative electrode including a material capable of reversible intercalation/deintercalation of lithium ions as a negative material, a separator interposed between the positive and negative electrodes, and an electrolyte on the separator wherein the electrolyte includes a non-aqueous organic solvent, a lithium salt, and a linear polymer having P=O bonds (Abstract and [0028, 0029, 0031, 0033]). (Applicant's claim 1)

Naoki discloses of using a phosphoric ester polymer in the electrolyte solution, see Fig. 3.

The amount of the phosphoric ester polymer is 5 vol%. Naoki discloses that the phosphoric ester polymer is 5 vol% and not wt%. Naoki does not disclose the density of the polymer to define a wt% of polymer in the electrolyte (applicant's claim 1). The Office notes that the density of most materials is about 1g/ml and thus, vol% is approximately weight %. It has been held that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05.

Naoki discloses using non-aqueous organic solvents comprising carbonates, such as ethylene carbonate (EC), propylene carbonate (PC), dimethyl carbonate (DMC), methylethyl carbonate (MEC), diethylene carbonate (DEC) [0028]. (Applicant's claims 2-4) and does not disclose that the non-aqueous solvent comprises a mixed solvent of a carbonate solvent and an aromatic hydrocarbon solvent (applicant's claims 5-8). However, Tsutsumi discloses of using a combination of high-permittivity solvent and a low-viscosity solvent for the benefit of obtaining high charging/discharging efficiency, as well as to keep the viscosity low. Examples of high-permittivity solvents include cyclic carbonates (7:1-8). Examples of aromatic hydrocarbons include benzene, toluene, and xylene, as low-viscosity solvents (7:1-25). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add an

aromatic hydrocarbon, such as benzene, toluene, and xylene to Naoki's Li ion battery for the benefit of reducing the electrolyte viscosity.

Tsutsumi discloses of using the high-permittivity solvents and low viscosity solvents in a volume ratio of preferable 1:4 to 2:1, preferably 1:2 to 1:1 (7:40-45). Carbonate solvent is a high permittivity solvent and aromatic hydrocarbon is a low viscosity solvent and it has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

Response to Arguments

Applicant's arguments filed 9/20/2007 have been fully considered but they are not persuasive.

Applicant asserts that Naoki does not establish a prima facie case of obviousness.

It is noted that it has been held that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties (emphasis added). Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05.

Applicant disagrees with the Examiner that the density of most materials is about 1 g/ml. Applicant points out that the density of diethyl vinyl phosphonate is 1.068 g/ml, and thus, vol% cannot be used to teach a wt%.

The Examiner remains unpersuaded. The Examiner notes that 1.068 g/ml is approximately 1 g/ml.

Applicant asserts that Naoki does not teach "a polymerized phosphonate compound with a polymerizable functional unsaturated hydrocarbon group or allyl tetraisopropylphosphonodiamidite" (emphasis added), as recited in claim 11.

This argument is not commensurate in scope with claim 11. Claim 11 recites that the polymer be formed of a polymerized phosphonate compound with a polymerizable functional unsaturated hydrocarbon group or allyl tetraisopropylphosphonodiamidite (emphasis added).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ckl

Cynthia Lee

Patent Examiner

SUSY TSANG-FOSTER
SUPERVISORY PATENT EXAMINER